



DELTRAN BATTERY CHARGER GENERAL OPERATING INSTRUCTIONS & USER SAFETY INFORMATION

GENERAL INTRODUCTORY NOTE: The wording of the instructions and warnings in the sections of this document pertaining to battery and electrical safety has been derived from that required by UL-1236, Underwriter's Laboratory Standard governing the safe operation of battery chargers used in engine start applications.

The wording of the safety instructions appearing in this document will in some cases differ from that published in the manuals that accompany various Deltran battery charger products. The intent here is to clarify the instructions and eliminate some of the ambiguities and possible confusion that may result when attempting to interpret the specific wording mandated by the UL standard. As such, this information should be viewed as a guideline to the safe and effective use of Deltran battery charger products.

The sections of this document pertaining to the operation details of various Deltran Battery charger models supplements similar instructions appearing in the published manuals for those specific models.

Table of Contents:

WORKING WITH LEAD ACID BATTERIES AND BATTERY CHARGERS:	2
GENERAL PRECAUTIONS:	2
ELECTRICAL CONNECTIONS BETWEEN THE CHARGER AND THE AC POWER OUTLET:	3
GENERAL OPERATION INFORMATION:	5
GENERAL TROUBLESHOOTING CHECK LIST:	5
SPECIFIC OPERATING INSTRUCTIONS FOR DELTRAN CHARGER PRODUCT GROUPS:	6
Battery Tender® Plus: Models:12V1.25A, 6V1.25A, 8V1.25A	7
International Battery Tender®: Model:12V1.25A	8
The Original Battery Tender®: Models:12V1.25A, 6V1.25A	9
Battery Tender® Junior: Models:12V0.75A, 6V0.75A	10
Lightweight, On-Board, Power Tender: Models: 6V6A, 12V6A, 24V3A.....	11
High Frequency, SUPERSMART® Chargers: Models: 12V20A, 24V20A, 36V15A, 48V10A.....	12
High Frequency, SUPERSMART® Chargers: EMERGENCY VEHICLE Model: 12V20A	14
Heavy Duty, Portable, Single & Dual Output DV Chargers:	15
Models: Single: 12V20A Dual: 12V10A, 12V20A	15
Jump 'N' Start™: Models: 450 Amp, 600 Amp	18



DELTRAN BATTERY CHARGER GENERAL OPERATING INSTRUCTIONS & USER SAFETY INFORMATION

WORKING WITH LEAD ACID BATTERIES AND BATTERY CHARGERS:

All lead acid batteries have the potential to emit gasses that may combine into a combustible or explosive mixture. In many cases, it is possible that lead acid batteries will emit these gasses during normal discharge and charging operations. Because of this potential danger, it is important that you follow the precautions recommended by both the battery and battery charger manufacturers before using either one.

GENERAL PRECAUTIONS:

ELECTRIC SPARK & OPEN FLAME: **NEVER** smoke or allow a source of electric spark or open flame in the vicinity of the battery or engine. (Hint: Don't charge the battery next to a gas water heater.)

CHARGER LOCATION: **LOCATE** the charger as far away from the battery as is allowed by the length of the output cable harness. **NEVER** set the charger above the battery. **NEVER** set the charger on a surface constructed from combustible material.

CHARGER VOLTAGE COMPATIBILITY: **NEVER** use a battery charger unless the battery voltage matches the output voltage rating of the charger. For example, do not use a 12-volt charger with a 6-volt battery and vice versa.

EXCESSIVE MOISTURE: Do not expose the charger to rain or snow.

CHARGER ATTACHMENTS: Do not use attachments that are not recommended or sold by the battery charger manufacturer. To do otherwise may result in the risk of electric shock, fire, or possibly some other unforeseen potential personal injury situations.

HANDLING POWER CORDS: When handling electric power cords, always pull by the plug rather than by the cord. This will reduce the risk of damage to both the plug and cord, and it will minimize the likelihood of electric shock resulting from that damage.

LOCATION OF POWER CORDS: Make sure all electric power cords are located so that they cannot be stepped on, tripped over, or otherwise subjected to damage or stress.

USING MANUALS: Study all of the battery manufacturer's precautions and specific recommendations for safe operation such as not removing cell caps while charging and the recommended rates of charge (charger output current).

VENTILATION: Do not operate the charger where ventilation is restricted. The intent here is to allow airflow to minimize and dissipate the heat generated by the charger and to diffuse the gasses that may be emitted by the battery.

MONITORING NON-SEALED BATTERIES: When leaving a battery charger connected to a non-sealed, flooded battery for extended periods of time (weeks, months, etc.), periodically check individual cell fluid levels against manufacturer's recommendations for safe operation. Also check the battery to see if it is unusually

warm. This is an indication that the battery may have a weak cell and that it could go into a thermal runaway condition.

MONITORING SEALED BATTERIES: When leaving a battery charger connected to a sealed battery for extended periods of time (weeks, months, etc.), periodically check the battery to see if it is unusually warm. This is an indication that the battery may have a weak cell and that it could go into a thermal runaway condition.

CHARGER MAINTENANCE: **NEVER** disassemble the charger or attempt to do internal repairs. Take it to a qualified service technician. Assembling the charger incorrectly may result in the risk of electric shock or create a fire hazard.

EXTENSION CORDS: An extension cord should not be used unless absolutely necessary. Using improper extension cord could result in a risk of fire and electric shock. If extension cord must be used, make sure that:

- That pins on the plug of extension cord have the same number, size, and shape as those of the AC power cord plug on the charger;
- That extension cord is properly wired and is in good electrical condition; and
- That wire size is as specified in Table 20 below.

Do not operate the charger with damaged cord or plug - replace them immediately.

EXTENSION CORD LENGTH & SIZE				
Length of Cord, Feet	25	50	100	150
Size of Cord, AWG	18	18	18	16

Table 1 Extension Cord Length & Size

ELECTRICAL CONNECTIONS BETWEEN THE CHARGER AND THE AC POWER OUTLET:

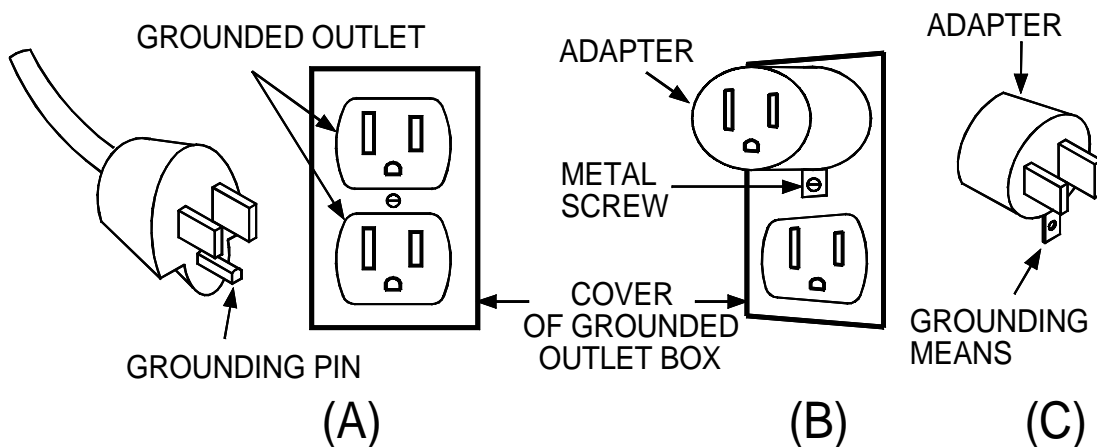


Figure 1 Electrical AC Power Outlet Connections



DELTRAN BATTERY CHARGER GENERAL OPERATING INSTRUCTIONS & USER SAFETY INFORMATION

GROUNDING AND AC POWER CORD SAFETY PRECAUTIONS (US & CANADA ONLY)

- Deltran battery chargers that are configured for use with a nominal 120-volt AC branch circuit (Typical U.S. residential 10A or 15A service outlets) have a power cord with a grounding plug that looks like the one illustrated in Figure 1A.
- A ground adaptor plug, like the one shown in Figure 1C, may be used to connect this plug to a two-pole receptacle as shown in Figure 1B if a properly grounded outlet is not available. This type of ground adapter plug should only be used until such time that a qualified electrician could install a properly grounded outlet.
CAUTION: The use of this type of 3 to 2 prong ground adapter plug is not allowed in Canada.
- **DANGER: Before using a ground adapter plug, be certain that the center screw of outlet plate is grounded.** The lug or green-colored wire with a rigid ear extending from the ground adapter plug must be connected to a properly grounded outlet. If necessary, consult with a qualified electrician to make sure that the AC outlet is properly grounded.

ELECTRICAL CONNECTIONS BETWEEN THE CHARGER AND THE BATTERY: Before charging, connect the charger leads (ring terminals or alligator clips) to the battery terminals. Then connect the charger AC power cord to the AC power outlet. When you want to disconnect the charger from the battery, first disconnect the charger AC power cord from the AC power outlet. Then disconnect the charger leads from the battery terminals.



CAUTION: Only connect or disconnect the charger output leads (ring terminals or alligator clips) at the battery terminals *WITHOUT* AC POWER connected to the charger. The charger AC power cord should not be connected to the AC power outlet.

CONNECTIONS FOR ALL LEAD-ACID BATTERY TYPE:

- First connect the red positive (+) charger output lead to the positive terminal of the battery. Then connect the black negative (-) charger output lead to the negative terminal of the battery.
- In the interests of applying an increased measure of safety to this process, particularly when working with standard, flooded, lead acid batteries, UL recommends that the second, negative (-) charger output lead connection be made to the grounded equipment chassis rather than directly to the negative battery post.
- In similar fashion, for positive ground systems, the positive post of the battery is now at the same electrical potential as the grounded equipment chassis. Therefore UL recommends that the positive (+) charger output lead connection be made at the grounded equipment chassis rather than directly to the positive battery post.



DELTRAN BATTERY CHARGER GENERAL OPERATING INSTRUCTIONS & USER SAFETY INFORMATION

GENERAL OPERATION INFORMATION:

AUTOMATIC CHARGING AND BATTERY STATUS

MONITORING: Deltran battery chargers are completely automatic and may be left connected to both AC power and to the batteries that they are charging for long periods of time. The charger output power, voltage, and current depends on the condition of the battery it is charging. Each charger has status indicator lights that provide a visual means to determine the operating mode of the charger, and hence the condition of the battery connected to the charger.

Depending on the charger model, either 2 or 3 status indicator lights are available. Combinations of these lights being either on or off or both, determine whether the charger is operating in one of the 3 primary charge modes: the bulk mode (full charge, constant current, battery is 0% to 85% charged), the absorption mode (high constant voltage, battery is 85% to 100% charged), or the storage/float maintenance mode (low constant voltage, battery is 100% to 103% charged).

For all Deltran chargers, when the battery is fully charged, the green status indicator light will turn on and the charger will switch to a storage/maintenance charge mode. Deltran chargers will automatically monitor and maintain the battery at full charge.

GENERAL TROUBLESHOOTING CHECK LIST:

- 1) NONE OF THE CHARGER STATUS INDICATOR LIGHTS TURN ON:**
 - a) Remove the charger from the AC outlet and recheck that the battery charger alligator clips or ring terminals are connected to the correct polarity battery terminals and that they are making a clean, tight connection.
 - b) Check to make sure that the AC outlet is supplying power by plugging in another appliance like a lamp, or check the outlet voltage with a voltmeter.
- 2) THE STORAGE/FLOAT MAINTENANCE STATUS INDICATOR LIGHT (GREEN LIGHT) GOES ON IMMEDIATELY WHEN CHARGING A BATTERY KNOWN TO BE DISCHARGED:**
 - a) The battery may be defective. Take the battery to the dealer to be tested.
 - b) The electrical connections between the charger and the battery may not be completely secured.
- 3) CHARGER IS CONNECTED AND CHARGING FOR A LONG TIME, BUT THE STORAGE/FLOAT MAINTENANCE STATUS INDICATOR LIGHT (GREEN LIGHT) DOES NOT TURN ON:**
 - a) The battery may be defective. Take the battery to the dealer to be tested.
 - b) The battery may have an excessive current draw from another appliance connected to its terminals. Remove the battery from the equipment.



DELTRAN BATTERY CHARGER GENERAL OPERATING INSTRUCTIONS & USER SAFETY INFORMATION

- c) The amp hour capacity of the battery may be too large to allow the charge cycle to be completed in the expected time. A good rule of thumb is to allow a recharge time equal to the battery amp hour capacity divided by the nominal charger output current plus 40%. Example: $(30 \text{ amp-hours} / 6 \text{ amps}) = 5 \text{ hours}$. 40% of 5 hours is 2 hours, so the total expected time for the green light to come on is 7 hours.
- 4) **THE CHARGE STATUS INDICATOR LIGHT (RED OR AMBER LIGHT) COMES ON AFTER THE CHARGER HAS ALREADY BEEN IN THE STORAGE/FLOAT MAINTENANCE MODE (GREEN LIGHT WAS ON):**
 - a) The battery may be defective. Take the battery to the dealer to be tested.
 - b) The battery may have an excessive current draw from another appliance connected to its terminals. Remove the battery from the equipment.
 - c) There may have been a momentary electrical power outage. This will cause the charger to reset and begin the charging the battery as if it was just connected.
- 5) **THE CHARGER CASE IS VERY WARM TO THE TOUCH, EVEN HOT:**
 - a) This is normal for the charger when it is delivering its maximum output power. Although Deltran battery chargers do not get this hot, for metal surfaces subject to casual contact, the maximum allowable case temperature for a battery charger under UL-1236 is $70^\circ\text{C} = 158^\circ\text{F}$. Any temperature over 130°F is very uncomfortable to touch. For plastic charger cases, the maximum allowable temperature is even higher.

SPECIFIC OPERATING INSTRUCTIONS FOR DELTRAN CHARGER PRODUCT GROUPS:

INTRODUCTION: The **Product Group** refers to a style of construction and a power range available at the charger output. The **Model** within a product group refers to the specific nominal output voltage and output current. Also, the software or charging algorithm for a specific battery type may be included in the model description. In some cases, the behavior of the status indicator lights depends on the software configuration. As you can see from the text boxes at the beginning of each charger section, the top line describes the product group, and the second line defines the models.

Each section describing the operation of a particular charger product group will contain 4 subheadings: 1) General Description, 2) Output Cable Connections, 3) Status Indicator Lights, and 4) Additional Troubleshooting Information.



DELTRAN BATTERY CHARGER GENERAL OPERATING INSTRUCTIONS & USER SAFETY INFORMATION

NOTE: The specific charger output voltage and current amplitudes, the timing control for these amplitudes, and the appearance of the status indicator lights is a function of the software. Check the specification summary sheets for the specific details.

Battery Tender® Plus: Models:12V1.25A, 6V1.25A, 8V1.25A

The Battery Tender® Plus

6 Volt, 1.25 Amp
8 Volt, 1.25 Amp
12 Volt, 1.25 Amp



GENERAL DESCRIPTION: The Battery Tender® Plus battery charger is a desktop, portable, linear power converter that has a true DC output at a maximum power level of approximately 18 or 9 watts respectively for the 12V and 6V models. Both models have a maximum output charging current of 1.25 amps.

NOTE: In recent years, the Sealed, GRT (Gas Recombinant Technology), AGM (Absorbed Glass Matte), Lead-Acid battery has enjoyed widespread acceptance in a variety of applications traditionally dominated by flooded battery technology. The Battery Tender® Plus battery charger circuitry provides a superior configuration to accommodate the more demanding recharge requirements of this superior battery technology. Although the original Battery Tender® battery charger will recharge AGM batteries, the full recharge time is longer than with the Battery Tender® Plus battery charger. This is because of the different implementation of the absorption charge mode between these two chargers. Those differences are spelled out in detail in other documents on the website. See Utility / Frequently Asked Questions.

OUTPUT CABLE CONNECTIONS: The battery charger DC output cable has a molded, quick disconnect plug. The ring terminal, alligator clip, and cigarette adapter output cable accessories all contain the mating plug.

STATUS INDICATOR LIGHTS: The following describes the operation of the status indicator lights:



DELTRAN BATTERY CHARGER GENERAL OPERATING INSTRUCTIONS & USER SAFETY INFORMATION

- **RED** - When the red light is on, the battery charger is in the process of fully charging the battery. In order to properly charge large capacity batteries, the charger may remain in this mode for several hours or even days.
- **GREEN FLASHING** - When the green light is flashing, and the red light is on, the battery is greater than 80% charged and may be removed from the charger and used if necessary. Leave the battery on charge until the green light is solid whenever possible. Once the green light begins to flash, it will remain flashing until either the battery charger output current drops below 0.1 amp, or until 6 hours has elapsed.
- **GREEN** - When the green light is lit, the battery charger is in the storage mode of charge. In this mode the charger will maintain the battery at full charge.

ADDITIONAL TROUBLESHOOTING INFORMATION:

No information to add to the general list for this charger product group.

International Battery Tender®: Model:12V1.25A

The International Battery Tender®

12 Volt, 1.25 Amp



GENERAL

DESCRIPTION: The International Battery Tender®

battery charger is a desktop, portable, switch-mode power converter that has a true DC output at a maximum power level of approximately 18 watts. The maximum output charging current is 1.25 amps.

NOTE: The International Battery Tender® battery charger is the next step in the technological evolution of the Battery Tender® charger family. The adaptation of switch-mode power conversion technology to this product line provides a more versatile, compact, lightweight, electrically and thermally efficient delivery system for essentially the same reliable functionality of the Battery Tender® Plus battery charger. Another significant benefit is that the International Battery Tender® battery charger has a true universal electrical input that allows it to be used anywhere in the world (where there is electric power available). All that is required is the correct AC power cord to connect to the local electric service.



DELTRAN BATTERY CHARGER GENERAL OPERATING INSTRUCTIONS & USER SAFETY INFORMATION

OUTPUT CABLE CONNECTIONS: The battery charger DC output cable has a molded, quick disconnect plug. The ring terminal, alligator clip, and cigarette adapter output cable accessories all contain the mating plug.

STATUS INDICATOR LIGHTS: The following describes the operation of the status indicator lights:

- **AMBER** - When the amber light is on, the battery charger is in the process of fully charging the battery. In order to properly charge large capacity batteries, the charger may remain in this mode for several hours or even days.
- **AMBER FLASHING** - When the green light is flashing, and the red light is on, the battery is greater than 80% charged and may be removed from the charger and used if necessary. Leave the battery on charge until the green light is solid whenever possible. Once the green light begins to flash, it will remain flashing until either the battery charger output current drops below 0.1 amp, or until 6 hours has elapsed.
- **GREEN** - When the green light is lit, the battery charger is in the storage mode of charge. In this mode the charger will maintain the battery at full charge.

ADDITIONAL TROUBLESHOOTING INFORMATION:

No information to add to the general list for this charger product group.

The Original Battery Tender®: Models:12V1.25A, 6V1.25A

GENERAL DESCRIPTION: The original Battery Tender® battery charger is a desktop, portable, linear power converter that has a true DC output at a maximum power level of approximately 18 or 9 watts respectively for the 12V and 6V models. Both models have a maximum output charging current of 1.25 amps.

NOTE: In recent years, the Sealed, GRT (Gas Recombinant Technology), AGM (Absorbed Glass Matte), Lead-Acid battery has enjoyed widespread acceptance in a variety of applications traditionally dominated by flooded battery technology. The Battery Tender® Plus battery charger circuitry provides a superior configuration to accommodate the more demanding recharge requirements of this superior battery technology. Although the original Battery Tender® battery charger will recharge AGM batteries, the full recharge time is longer than with the Battery Tender® Plus battery charger. This is because of the different implementation of the absorption charge mode between these two chargers. Those differences are spelled out in detail in other documents on the website. See Utility / Frequently Asked Questions.

OUTPUT CABLE CONNECTIONS: The battery charger DC output cable has a molded, quick disconnect plug. The ring terminal, alligator clip, and cigarette adapter output cable accessories all contain the mating plug.



DELTRAN BATTERY CHARGER GENERAL OPERATING INSTRUCTIONS & USER SAFETY INFORMATION

STATUS INDICATOR LIGHTS: The following describes the operation of the status indicator lights:

- **RED** - When the red light is on, the battery charger is in the process of fully charging the battery. In order to properly charge large capacity batteries, the charger may remain in this mode for several hours or even days.
- **GREEN** - When the green light is lit, the battery charger is in the storage mode of charge. In this mode the charger will maintain the battery at full charge.

ADDITIONAL TROUBLESHOOTING INFORMATION:

No information to add to the general list for this charger product group.

Battery Tender® Junior: Models:12V0.75A, 6V0.75A



The Battery Tender® Junior

**6 Volt, 0.750 Amp
12 Volt, 0.750 Amp**

GENERAL

DESCRIPTION: The Battery Tender® Jr. battery charger is a wall mounted, linear power converter that has a true DC output at a

maximum power level of approximately 9 or 5.5 watts respectively for the 12V and 6V models. Both models have a maximum output charging current of 0.75 amps.

OUTPUT CABLE CONNECTIONS: The battery charger DC output cable has a molded, quick disconnect plug. The ring terminal, alligator clip, and cigarette adapter output cable accessories all contain the mating plug.

STATUS INDICATOR LIGHTS: The following describes the operation of the status indicator lights:

- **RED** - When the red light is on, the battery charger is in the process of fully charging the battery. In order to properly charge large capacity batteries, the charger may remain in this mode for several hours or even days.



DELTRAN BATTERY CHARGER GENERAL OPERATING INSTRUCTIONS & USER SAFETY INFORMATION

- **GREEN** - When the green light is lit, the battery charger is in the storage mode of charge. In this mode the charger will maintain the battery at full charge.

ADDITIONAL TROUBLESHOOTING INFORMATION:

No information to add to the general list for this charger product group.

Lightweight, On-Board, Power Tender: Models: 6V6A, 12V6A, 24V3A



The Battery Tender® Light Weight On-Board

**6 Volt, 6 Amp
12 Volt, 6 Amp
24 Volt, 3 Amp**

GENERAL DESCRIPTION: The lightweight, on-board, power tender, battery charger is a high frequency switching power converter that has a true DC output at a maximum power level of approximately 70 watts. The most common output voltage and current configurations are defined as models in the title block. Check with the factory for other output voltage and current configurations that may be available. Also, a variety of software configurations are available: Standard; Sealed, VRLA, GRT, AGM (Hawker/Optima); and GEL.

OUTPUT CABLE CONNECTIONS: The battery charger is equipped with an SPT-2 type output cable with two output leads. The positive polarity output lead has a 3/8" diameter ring terminal with a red molded polymer insulation cylinder. The negative polarity output lead has a 5/16" diameter ring terminal with a black molded polymer insulation cylinder.

The standard unit does not have a quick disconnect output cable harness. Quick disconnect output cable harnesses may be available on a special order basis. The price for units with this modification will be higher than those units shown on the standard price list. The price will depend on the volume purchased.



DELTRAN BATTERY CHARGER GENERAL OPERATING INSTRUCTIONS & USER SAFETY INFORMATION

STATUS INDICATOR LIGHTS: The following describes the operation of the status indicator lights:

- **RED** - When the red light is on, the battery charger is in the process of fully charging the battery. In order to properly charge large capacity batteries, the charger may remain in this mode for several hours or even days.
- **GREEN FLASHING (Hawker/Optima [Sealed, GRT, AGM] Models only)** - When the green light is flashing, and the red light is on, the battery is greater than 80% charged and may be removed from the charger and used if necessary. Leave the battery on charge until the green light is solid whenever possible. This will occur approximately 8 hours after the green light begins flashing.
- **GREEN** - When the green light is lit, the battery charger is in the storage mode of charge. In this mode the charger will maintain the battery at full charge. If the battery becomes partially discharged due to an external current draw or excessive internal battery losses, the charger will automatically switch itself back to the charge mode of operation.
- **ALTERNATING RED AND GREEN** - When the lights switch back and forth, the battery charger is connected to the battery with the polarity reversed.

ADDITIONAL TROUBLESHOOTING INFORMATION:

No information to add to the general list for this charger product group.

High Frequency, SUPERSMART[®] Chargers: Models: 12V20A, 24V20A, 36V15A, 48V10A
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The Battery Tender[®]
High Frequency
SuperSmart[®] (Golf Cart)

12 Volt, 20 Amp
24 Volt, 20 Amp
36 Volt, 15 Amp
48 Volt, 10 Amp



GENERAL DESCRIPTION: The high frequency, SUPERSMART[®] (golf-cart style) battery charger is a high frequency switching power converter that has a true DC output at a maximum power level of approximately 600 watts for all models except the 12V20A which is a 300 watt unit. The most common output voltage and current configurations



DELTRAN BATTERY CHARGER GENERAL OPERATING INSTRUCTIONS & USER SAFETY INFORMATION

are defined as models in the title block. Also, a variety of software configurations are available: Standard; Sealed, VRLA, GRT, AGM (Hawker/Optima); and GEL.

OUTPUT CABLE CONNECTIONS: The battery charger is equipped with separate output leads for the positive and negative polarity connections. The models with Sealed GRT/AGM (Hawker/Optima) software have a third, yellow wire that is a voltage sense connection. The yellow and red wires should both be connected together at the positive terminal of the battery. Also, on the Sealed GRT/AGM models, there is a small, momentary, push-button switch to select between software options. The standard output cable configuration does not include a quick disconnect harness.

STATUS INDICATOR LIGHTS: The following describes the operation of the status indicator lights:

- **AMBER (Yellow)** - When the amber light is on, the battery charger is in the process of fully charging the battery. In order to properly charge large capacity batteries, the charger may remain in this mode for several hours or even days.
- **AMBER (Yellow) FLASHING (Hawker/Optima [Sealed, GRT, AGM] Models only)** - When the amber light is flashing, the charger is in the "Monthly" mode of charging. This is a fixed length absorption charge prior to float/maintenance. To engage the monthly charge mode, depress and hold the charge selector button for 3 to 5 seconds immediately after applying AC power to the charger.
- **GREEN FLASHING (Standard Models only)** - When the green light is flashing, and the amber light is on, the battery is greater than 80% charged and may be removed from the charger and used if necessary. Leave the battery on charge until the green light is solid whenever possible.
- **GREEN** - When the green light is lit, the battery charger is in the storage mode of charge. In this mode the charger will maintain the battery at full charge. If the battery becomes partially discharged due to an external current draw or excessive internal battery losses, the charger will automatically switch itself back to the charge mode of operation.
- **RED** - When the red light is on, there is a malfunction in the charger.
- **RED FLASHING (Hawker/Optima [Sealed, GRT, AGM] Models only)** - When the red light is flashing, the battery has either not been connected to the charger, or it has been connected improperly.

ADDITIONAL TROUBLESHOOTING INFORMATION: If the green status indicator light turns almost immediately after beginning to charge a battery that is known to be discharged, then check the output fuse. The only function that the output fuse performs is to protect the charger circuitry from a reverse polarity connection. Replacement: 25 Amp (or 30 Amp), 125 Volt, Cartridge, 0.25 inch by 1.25 inch, Ceramic, Fast Blow, for example: Bussman PN: ABC-25 or ABC-30. Alternate:



DELTRAN BATTERY CHARGER GENERAL OPERATING INSTRUCTIONS & USER SAFETY INFORMATION

Littelfuse PNs 314-025 or 314-030, Cartridge Style, Ceramic Body, 3AB, Fast Acting Type, Rated at 25 or 30 Amps, respectively.

High Frequency, SUPERSMART[®] Chargers: EMERGENCY VEHICLE Model: 12V20A

GENERAL DESCRIPTION: The Emergency Vehicle Charger is one of the model variants of the high frequency, SUPERSMART[®], golf-cart style battery charger. It is a high frequency switching power converter that has a true DC output at a maximum power level of approximately 300 watts.

OUTPUT CABLE CONNECTIONS: The battery charger is equipped with a terminal block for direct connections to AC and DC power.

STATUS INDICATOR LIGHTS: The indicator lights are mounted on a remote panel: The remote panel is marked as follows: From top to bottom: BATTERY STATUS, then the green light, FULL CHARGE, then the red light, and finally BATTERY LOW WHEN FLASHING. The following describes the operation of the status indicator lights:

- **GREEN FLASHING** - When the green light is flashing, the charger is charging the battery normally, in either the bulk or absorption mode. There is no separate indication for those two sequential modes.
- **GREEN** - When the green light is lit, the battery charger is in the storage mode of charge. In this mode the charger will maintain the battery at full charge. If the battery becomes partially discharged due to an external current draw or excessive internal battery losses, the charger will automatically switch itself back to the charge mode of operation. However, this charger will allow a parasitic load of up to 8 amps without engaging the full charge reset function.
- **RED FLASHING** - When the red light is flashing, the battery voltage has dropped to below 11.75 VDC. At this time, the operator should plug the charger into the AC power receptacle. The flashing red indication will only be given when no AC power is applied to the charger.

ADDITIONAL TROUBLESHOOTING INFORMATION: If the green status indicator light turns on almost immediately after beginning to charge a battery that is known to be discharged, then check the output fuse. The only function that the output fuse performs is to protect the charger circuitry from a reverse polarity connection. If the fuse is defective, then replace it with one of the proper physical size and electrical current rating. Emergency Vehicle Chargers use the same fuse. 25 Amp (30 Amp is also



DELTRAN BATTERY CHARGER GENERAL OPERATING INSTRUCTIONS & USER SAFETY INFORMATION

acceptable), 125 Volt, Cartridge, 0.25 inch by 1.25 inch, Ceramic, Fast Blow, for example: Bussman part number: ABC-25 or ABC-30.

Heavy Duty, Portable, Single & Dual Output DV Chargers: Models: Single: 12V20A Dual: 12V10A, 12V20A



The Battery Tender®
Heavy Duty, Portable
Dual Output
DVD-20, DVD-40
12 Volt, 10 Amp
12 Volt, 20 Amp

The Battery Tender®
Heavy Duty, Portable
Single Output
DVS-20

12 Volt, 20 Amp



GENERAL DESCRIPTION: The single and dual channel, heavy duty, portable chargers have been employed in the Marine industry for a number of years. They are linear power converters that have an effective DC output at a maximum power level of approximately 300 or 600 watts. All output channels have a 12V nominal output voltage with a maximum charging current of either 10A (DVD-20, dual) or 20A (DVS-20, single or DVD-40, dual). Also, a variety of software configurations are available: DELCO; Standard; Sealed, VRLA, GRT, AGM (Hawker/Optima); and GEL.

OUTPUT CABLE CONNECTIONS: The DVS and DVD chargers all have jumper cable type output harnesses with heavy-duty alligator clamps.



DELTRAN BATTERY CHARGER GENERAL OPERATING INSTRUCTIONS & USER SAFETY INFORMATION

STATUS INDICATOR LIGHTS: The indicator lights are located in a horizontal row, 1 green light, and 5 red lights. Single channel chargers have only one row of lights, and dual channel chargers have two rows of lights. Each channel on a dual charger is completely independent from the other, so the indication on either row of lights may be different at any given time. The following describes the operation of the status indicator lights:

- **GREEN** - When the green light is on and not flashing, the charger is ready to begin charging the battery normally. After only a few seconds, the green light will turn off and gradually; each of the 5 red lights will begin to come on. This is an indication that the charger is charging the battery normally.
- **RED** - When the red lights turn on and do not flash, the battery is being recharged normally. You will notice a number below each red light: either 2, 4, 6, 8, or 10 for 10A units, or 4, 8, 12, 16, or 20 for 20A units. These numbers represent how much current the charger is delivering to the battery. If all 5 red lights are on, then the charger is delivering between 8 to 10 amps (10A units) or between 16 and 20 amps (20A units) to the battery. As the red lights begin to turn off, gradually, from right to left, then the battery is becoming fully charged and it is drawing less current from the charger.
- **GREEN FLASHING** - When the green light is flashing, the charge cycle is complete, and the battery charger is in the storage mode of charge. In this mode the charger will maintain the battery at full charge.
- **RED FLASHING** - When the red lights are flashing, the charger is experiencing some type of abnormal condition. For example, the battery is not accepting charge current at the correct level that corresponds to its voltage, or there could be a faulty connection between the charger and the battery.

ADDITIONAL TROUBLESHOOTING INFORMATION: If the **CHARGER DOES NOT TURN ON:** Turn off the power switch and then remove the charger AC plug from the power outlet. Check the fuse located in a fuse-holder on the rear panel of the charger. If the fuse is defective, replace it. All heavy-duty chargers use a Cartridge type, 250 Volt, Ceramic, Fast Blow, 0.25 inch by 1.25 inch. For the DVD-20 and the DVS-20, the fuse rating is 10 amps and for the DVD-40, the fuse rating is 15 amps. For example, Bussman part numbers ABC-10 and ABC-15.

Multiple Charging Station, Shop Charger: Models: 5 Bank & 10 Bank 12V1.25A

GENERAL DESCRIPTION: The Multiple Charging Station, Shop Charger uses either 5 or 10 independent Battery Tender® Plus battery charger circuits in a single enclosure. Each circuit is a linear power converter that has a true DC output at a maximum power level of approximately 29 watts. Both models have a maximum output charging current of 2.0 amps. This is a higher current output than the stand-alone Battery



DELTRAN BATTERY CHARGER GENERAL OPERATING INSTRUCTIONS & USER SAFETY INFORMATION

Tender® Plus battery charger circuits because each shop charger has an internal fan to provide forced air cooling of all active, semiconductor components.

OUTPUT CABLE CONNECTIONS: Each of the 5 or 10 channels of the shop charger has DC output cables with a molded, quick disconnect plug. The ring terminal, alligator clip, and cigarette adapter output cable accessories all contain the mating plug.

STATUS INDICATOR LIGHTS: The indicator lights behave in exactly the same way as the Battery Tender® Plus battery charger. The following describes the operation of the status indicator lights:

- **AMBER** - When the amber light is on, it indicates that the **AC POWER IS ON**, either 110 or 220 VAC, depending on the factory setting.
- **RED** - When the red light is on, the battery charger is in the process of fully charging the battery. In order to properly charge large capacity batteries, the charger may remain in this mode for several hours or even days.
- **GREEN FLASHING** - When the green light is flashing, and the red light is on, the battery is greater than 80% charged and may be removed from the charger and used if necessary. Leave the battery on charge until the green light is solid whenever possible. Once the green light begins to flash, it will remain flashing until either the battery charger output current drops below 0.1 amp, or until 8 hours has elapsed.
- **GREEN** - When the green light is lit, the battery charger is in the storage mode of charge. In this mode the charger will maintain the battery at full charge.

ADDITIONAL TROUBLESHOOTING INFORMATION:

- 1) **72 HOUR SAFETY TIMER:** 72 hours after the charger is turned on, if the battery voltage does not increase to the absorption level (14.75 Volts), then the charger will automatically switch to maintenance mode (float level = 13.2 Volts). When this happens, both the green and red lights will illuminate. The GREEN light will be SOLID and the RED light will be FLASHING at a high rate. Check the battery condition. It may indicate that a very large, good battery is not fully charged, or that a smaller size battery is defective, or that there is some problem with the electrical connections.
- 2) **BATTERY LOW VOLTAGE MONITOR:** If the battery is totally dead (below 2 volts) the Battery Tender® charging circuit will not start and the lights will not turn on. The internal charger safety circuit must sense more than 2 volts before it will allow the charger to turn on. **Note:** Most 12-volt lead acid batteries are likely to be defective if their voltage is below 9 volts.
- 3) **FAN OPERATION:** The fan only runs whenever a charger is connected to a battery, and the charger is plugged into AC power. The fan ensures proper ambient temperature for the charger circuitry throughout the entire charge cycle. To avoid unnecessary risk of temperature related problems; please ensure that there is at least a 2-inch OPEN SPACE on both sides of the charger housing. This is to provide a clear airflow path for both the fan and the vent.

- 4) **CHARGER DOES NOT TURN ON:** Turn off the power switch and then remove the charger AC plug from the power outlet. Then check the fuse located in a fuse-holder on the front panel of the charger. If the fuse is defective, then replace it with one of the proper physical size and electrical current rating. Both the 5-Bank and 10-Bank Shop Chargers use the same fuse. 10 Amp, 250 Volt, Cartridge, 0.25 inch by 1.25 inch, Ceramic, Fast Blow, for example: Bussman part number: ABC-10.

Jump 'N' Start™: Models: 450 Amp, 600 Amp

The Battery Tender® Jump 'N' Start

GENERAL DESCRIPTION: The Jump 'N' Start™ is a portable battery power pack for emergency engine start applications. It contains a battery capable of providing repetitive, 3 to 5 second bursts of 450 to 600 cranking amps. The unique, durable, plastic case has integral jumper cables with heavy-duty, automotive type alligator clamps. The Jump 'N' Start™ also contains an enhanced Battery Tender® battery charger circuit to recharge the internal battery.



OUTPUT CABLE CONNECTIONS:

The PRIMARY output cables are jumper cables with heavy-duty, automotive type alligator clamps.



NEVER TOUCH THE ALLGATOR CLAMPS TOGETHER! They are directly connected to a battery that can deliver over 1000 amps of short circuit current.

Other output connections are available through either a cigarette adapter mounted on the front of the case or a small, 2 wire, 2-pin, white connector mounted on the side with near the positive alligator clamp.

BATTERY CHARGING SELECTOR SWITCH: This is a black rocker type switch labeled: "BATTERY CHARGING", embossed into the plastic. This switch determines whether the alternate output connectors are connected to either the internal battery or to the Battery Tender® battery charger circuit. The upper switch position is labeled "INTERNAL BATTERY". This position connects the 2 wire, 2-pin cable with the white connector to the battery inside the Jump 'N' Start™. With the AC power cord is not connected, the internal charging circuit can be powered by a 12VDC source connected to the white connector. The internal battery can also be used to power other appliances that require less electrical current. The upper switch position is labeled "EXTERNAL".



DELTRAN BATTERY CHARGER GENERAL OPERATING INSTRUCTIONS & USER SAFETY INFORMATION

BATTERY". This position connects the cigarette adapter to the Battery Tender® battery charger circuit. It allows an external battery to be charged with an appropriate mating plug by connecting to the cigarette adapter. You must also connect the AC power to a proper electrical outlet so that the Battery Tender® battery charger circuit will be turned on. When the charger circuit is turned on, the indicator lights on the front of the Jump 'N' Start™ will behave in exactly the same way as if the internal battery were being charged.

CAUTION:



If you use the Jump 'N' Start™ to power other appliances, you may run down the battery and not have enough power available to start an engine. The typical Jump 'N' Start™ battery is rated at 16 amp-hours at a 10 hour discharge rate, so depending on how much current the appliance draws, the Jump 'N' Start™ battery will only last a few hours. For example, an appliance that draws 5 amps will run down the battery in about 3 hours. Whenever possible, use the internal Battery Tender® battery charger circuit to recharge the battery. The AC power cord for the battery charger is located just below the negative alligator clamp.

WHEN JUMP STARTING A BATTERY:

1. Turn off the ignition.
2. **Do not touch the Jump 'N' Start alligator clamps together!**
3. Connect the red clamp to the positive post on the battery.
4. Connect the black clamp to the negative post on the battery or on any grounded part of the chassis.
5. Turn on the ignition.
6. If the motor does not start in 6 seconds, wait 3 minutes and try again.
7. Always remove the black clamp first.
8. Return the alligator clamps to their storage positions on the Jump 'N' Start case.

STATUS INDICATOR LIGHTS: The following describes the operation of the status indicator lights:

- **RED** - When the red light is on, the battery charger is in the process of fully charging the battery. In order to properly charge large capacity batteries, the charger may remain in this mode for several hours or even days.
- **GREEN** - When the green light is lit, the battery charger is in the storage mode of charge. In this mode the charger will maintain the battery at full charge.

ADDITIONAL TROUBLESHOOTING INFORMATION:

BATTERY TERMINALS: Before connecting the alligator clamps to a battery, make sure that the terminals are clean. If they are dirty or corroded, then the clamps will not make good electrical contact and the Jump 'N' Start™ battery will probably not be able to start the engine. Even if it does start the engine, when the vehicle alternator starts running, it will not be able to recharge the vehicle battery. The next time you try to start the engine, battery will most likely still be dead you will need to use the Jump 'N' Start™ again.